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TECHNICAL NOTE

U.S. DEPARTMENT OF THE INTERIOR – BUREAU OF LAND MANAGEMENT

USE OF ARTIFICIAL SHADE TO INCREASE SURVIVAL OF
DOUGLAS-FIR IN THE ROSEBURG AREA

by

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Shade has been shown to increase survival of conifers in northern California, Idaho, Montana and Oregon. Both live and dead shade have been used (Adams 1966, Minore 1969, Roy 1955, Ryher and Potter 1970, Wahlenberg 1930, Youngberg 1966).

We knew that shade had potential but did not know if it would work in our area, or which soils needed it, or if it was cost effective.

In 1973 the first trials were begun on shading in the Roseburg BLM District (Roseburg is located in Southwest Oregon). The trials used cedar shingles to shade 2-0 Douglas-fir seedlings. They were located on four major soil series south of Roseburg.

The soils belonged to the Vermisa, Beekman, McGinnis and Pollard series. The first two are loamy-skeletal with a water holding capacity of 2 to 5 inches. The second two are high in clay. The McGinnis is clayey-skeletal and the Pollard is fine textured. Water holding capacity is 4 to 8 inches.

Results after one year showed that shading increased survival on soils with a low water holding capacity, but not on soils that had a high water holding capacity. Survival was increased from 43% unshaded to 68% shaded on Vermisa and Beekman soils on southerly aspects. (Robert Lewis - report on file at Roseburg BLM.) These results were from operational shading which means that the problems, i.e., poor planting, poor stock, are included. These figures are therefore conservative. The study also showed that shading is not a substitute for vegetation control.

After these encouraging results, more operational shading was begun. More field trials were also installed that concentrated on the steep, loamy-skeletal soils.

We have two studies that have two-year results and ten that have one-year results. The two studies with 2 years of measurements are located in the southern part of the District (West Fork of Canyon Creek) and one in the northern part (Stradle Ridge).

West Fork of Canyon Creek (Sec. 8, T. 31 S., R. 5 W.)

In December 1975, 200 Douglas-fir seedlings (2-0) were planted on a 383 soil series. The soil had 4 to 16 inches of gravel over a gravelly silt loam or clay loam subsoil. Hoedads were used to first scrape away the gravel and then plant the seedlings in the subsoil where the moisture holding capacity was greater. Slopes are generally over 65% but less than 80% and face south to southeast. The area was cut in 1971 and planted in 1971 and 1975. Both plantings failed.

A fiberboard shade (Picture 1), mounted on a wire tripod, developed by this District, was used for shade. The fiberboard was wax coated designed to make them last for 2 years.

RESULTS

Two year results for this study are shown in Table 1. Survival of unshaded seedlings was 55% after 2 summers, while shaded was 92%. Shading accounted for 37% of the survival. Shade also has maintained survival. The unshaded seedlings showed a decline in survival the second year.

Stradle Ridge (Sec. 23, T. 24 S., R. 1 W.)

On December 3 and 4, 1975, early lifted stock from Wind River Nursery was planted on a southerly aspect on Stradle Ridge. Hoedads were used to plant 300 2-0 bare root seedlings on a 75% south facing slope.

On February 27, 1976, an additional 100 seedlings were planted on the same site. They were 2-0 bare root and lifted from Elkton Nursery in February.

The plantings were made to test shading for increasing seedling survival on Twindar soils with a gravel overlay. Twindar soils are 20-40" deep and have a gravelly loam or clay loam texture. An 8" X 12" fiberboard tripod shade was used (Picture 1).

TABLE 1 - Field Study on Shade (West Fork of Canyon Creek)

CONTROL					SHADE				
Date	Total Inspected	Planted	%	(1) Cost Per Acre	Total Planted	Planted	%	(2) Cost Per Acre	
				Survival				Survival	
8-16-76	50	38	76	\$70	50	48	96	\$180	
10-12-76	50	38	76		50	46	92		
8-18-77	50	28	55		50	46	92		

All costs are based on 300 seedlings per acre. Shading costs are based on local contract.

(1) \$15 for trees + \$55 for planting and scalping = \$ 70.00

(2) \$15 for trees + \$55 for planting and scalping +
\$70 for shades + \$40 to install shades = \$180.00

RESULTS

Table 2 shows the results after two years. Shading doubled survival rates. Survival was increased from 39% on unshaded control to 77% for the shaded. Both the shaded and unshaded showed about a 10% drop in survival after the second year.

CONCLUSIONS AFTER TWO YEARS

1. Fiberboard shades produced significant increases in survival. 35 to 38% additional survival was obtained after 2 years. This additional survival amounts to 67% and 97% increase.*
2. Shading has maintained survival above the acceptable level after 2 years.
3. Fiberboard shades have lasted 2 years and look like they will make it several more.
4. Fiberboard shades are stable. Very few blew over.
5. Cost of artificial shading was \$110/acre for 300 shades/acre (Includes material and installation). We feel this cost is reasonable when one considers that many of the loamy-skeletal soils will not reforest without shade.

TABLE 2 - Field Study on Shade (Stradle Ridge)

CONTROL					SHADE				
Date Inspected	Total Planted	% Sur- vival	Cost Per Acre	(1)	Total Planted	% Sur- vival	Cost Per Acre	(1)	Cost Per Acre
6-16-76	150	---	---	\$55	50	---	---	\$130	
8-17-76	150	82	55		50	43	88		
10-1-76	150	72	48		50	42	85		
8-30-77	150	61	39		50	38	77		

200 tree/ac was used to figure cost. This soil is not capable of producing a normal stocked stand (according to BUL 201).

(1) (Shades cost 23¢ each) \$45 shades + \$30 to install shades + \$55 for threes and planting = \$130/acre.

$$* \% \text{ Increase} = \frac{\text{Survival with shade} - \text{Survival without shade}}{\text{Survival without shade}} \times 100$$

STUDIES HAVING 1ST YEAR RESULTS

Listed in Table 3 are 10 field studies located throughout the southern part of the Roseburg District. All seedlings were 2-0 bare root. Douglas-fir, Ponderosa Pine, and Jeffrey Pine were shaded.

Shade increased survival on all sites. It accounted for 46% of the survival in one extreme and 5% in the other extreme. On the average, survival was 69% when shaded and 43% unshaded.

With the exception of Quartzite #2, all the soils have a low water holding capacity. This data points out that these soils do need artificial shade.

TABLE 3 - Seedling Survival With Use of Artificial Shades

Name of Unit	Soils	Aspect	Type of Shade	Species Planted	% Alive		Comments
					Shaded	Unshaded	
Gully Cat		W	Fiberboard	Doug-fir	81	48	
Quartzite #1	372	SW	"	"	74	28	
Quartzite #2	381	SW	"	"	76	61	
Olalla Fire	372	S	"	"	58	53	Sprayed with Atrazine
Cow Head	372	S	"	P. Pine	87	73	Sprayed with Atrazine
Buck Springs	372	SE	Stakes	Doug-fir	74	49	Sprayed with Atrazine and Dowpon
Doe Creek Fire (Serpentine Soil)	771	SW	"	P. Pine & J. Pine	83	44	Dead unshaded P. Pine trees were very hard to find.
Deadman	371	SE	"	Doug-fir	61	25	Poor stock
Deadman	371	SE	Fiberboard	"	54	25	Poor stock
Deadman	371	SE	Hexagon	"	<u>39</u>	<u>25</u>	Poor stock
				Average	69	43	

We have tried four different types of shade.. Cedar shingles were the first. They were effective but difficult to handle and they had a tendency to fall down. (Cost = 4¢ per shingle + \$45/ac to install)

Some 70,000 fiberboard tripods (Picture 1) have been used. They are easy to install, are stable, and effective. They are, however, more expensive than the other 3 types of shade. Obviously the wire is not biodegradable. (Cost = 23¢ per tripod + \$49 to install)

Approximately, 113 acres have been shaded with 24" X 1 1/2" fir stakes. They are effective but difficult to handle. (Cost = 16¢ for 4 stakes + \$54 to install)

A few acres have been shaded with a hexagon shaped tube. It has a diameter of 7" and is 12 inches high. They are held in place with a wooden stake. The hexagon shades are stable, biodegradable, but are not as effective as the other 3 types of shade. (See Table 3) (Cost = 14¢ for hexagon + \$40 to install)

We are convinced that shading is a viable way of increasing survival. The results have been so encouraging that a cost comparison was made between shelter wood cutting and clear cutting. Appendix 1 is a comparison made by Robert Lewis and Dennis Miller. Their comparison showed that clear cutting plus artificial shade was \$337/acre cheaper than a 2-stage partial cut. Table 4 shows the breakdown of costs.

TABLE 4

	Shelterwood	Clearcut
Logging Cost	\$ 970.56	\$633.24
Slash Disposal	55.86	14.50
Planting	50.00	50.00
Grass Spray	13.00	13.00
Artificial Shade	-----	120.00
	<u>\$1,089.42</u>	<u>\$830.74</u>

We believe the difference in logging cost, between shelterwood and clear cuts shown here, is more than enough to give us reason to pause before advocating shelterwoods in the Roseburg Area.



Figure 1. Artificial shade made of .060" thick water-proofed fibreboard and No. 9 wire.

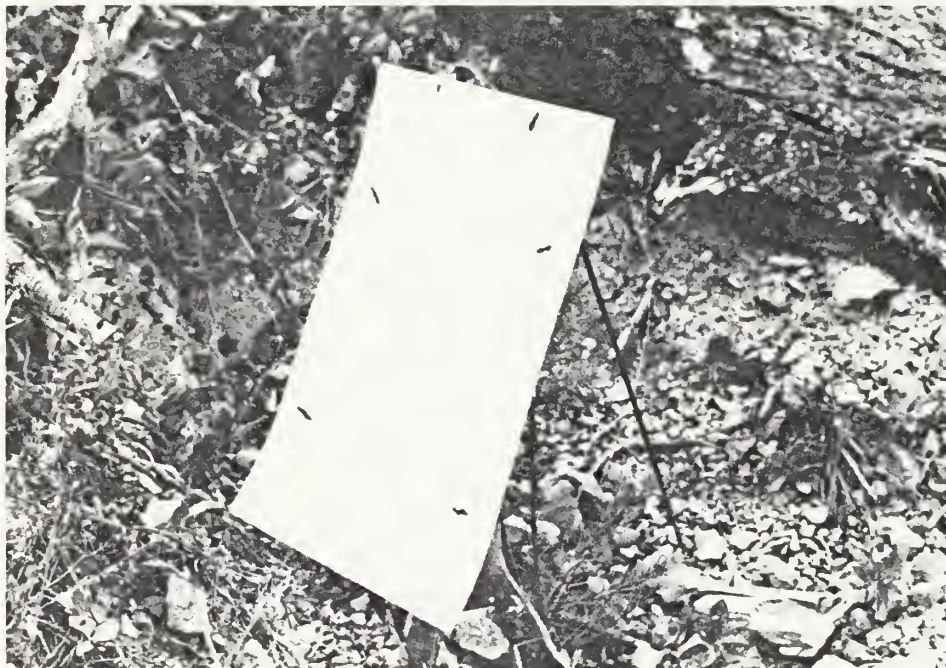


Figure 2. Artificial shade installed to protect Douglas-fir seedlings from intense solar radiation. Shade had been installed for four months at the time photo was taken.

LITERATURE CITED

1. Adams, R.S. John Ritchey, and Todd Gary, 1966 Artificial shade improves survival of planted Douglas-fir and White fir seedlings. Calif. Div. Forest. State Forest Notes. 28 11p.
2. Monore, D. 1969 Shade benefits Douglas-fir in southwestern Oregon cutover area. Tree Planter's Notes. Vol. 22 No. 1.
3. Roy D.F. 1955 Don't plant close to unbarked logs. Calif. Forest and Range Exp. Sta. Forest Res. Note. 101 p. 1.
4. Ryker, R.A. and D.R. Potter, 1970 Shade increases first-year survival of Douglas-fir seedlings. USDA F.S. Res. Note INT-119. Inter. Mountain F. & R. Exp. Sta., Ogden, Utah.
5. Wahlenberg, W.G. 1930 Effect of Ceanothus brush on western yellow pine plantations in northern Rocky Mountains. J. Agr. Res. 41: 601-612.
6. Youngberg C.T. 1966 Silvicultural benefits from brush. Soc. Amer. Forest Proc. 1965 55-59.



